

REMARKS

Claims 1-12 have been examined. Claims 1, 3, 6 and 8 have been rejected under 35 U.S.C. § 102 (b), and claims 2-4 and 7-9 have been rejected under 35 U.S.C. § 103(a). Claims 13-18 are added by this Amendment.

I. Preliminary Matters

The Examiner has not indicated whether the drawings filed with the application on August 16, 2000 are acceptable. Accordingly, Applicant requests the Examiner to indicate whether or not the submitted drawings are acceptable.

Applicant has made minor editorial changes to the Abstract. The proposed changes remove the “comprising” language from the Abstract in conformance with MPEP § 608.01(b) guidelines. Applicant has also amended the specification to correct minor errors.

Claims 1, 4 and 6 have been amended to clarify the language set forth. Applicant submits that such amendments do not narrow the scope of the claims, but merely redefine or rearrange what was already included and, therefore, do not subject the claims to prosecution history estoppel.

The Examiner has objected to claims 5 and 10-12 under 37 C.F.R. § 1.75(c) as being in improper form because a multiple dependent claim cannot depend from any other multiple dependent claim. Therefore, the Examiner has not examined the claims on the merits.

Accordingly, Applicant has corrected the dependency problem and requests the Examiner to examine the claims on the merits in a subsequent Office Action.

In addition, Applicant submits a proposed drawing correction and respectfully requests the Examiner to review and approve such correction. The correction, indicated in pink highlighter, is made to show that cut punch 60a can be formed without recess 107(a), which is shown in Fig. 11.

II. Rejections under 35 U.S.C. § 102(b)

A. The Examiner has rejected claims 1, 3, 6 and 8 under 35 U.S.C. § 102 (b) as being anticipated by U.S. Patent 5,690,974 to Miyairi ("Miyairi").

With respect to claim 1, the Examiner maintains that Miyairi discloses the claimed injection molding method. However, Applicant submits that claim 1 is not anticipated by Miyairi. For example, as recited in claim 1, molten resin material is injected into a cavity defined by a fixed die and a movable die via a gate provided in the fixed die. The molten resin material is injected in a resin reservoir, where it then flows into the cavity by way of a communication portion between the resin reservoir and cavity. A cut punch, provided in the movable die, moves towards the gate to separate a resin molded product in the cavity from the resin in the resin reservoir, when an inner portion of resin in the resin reservoir is still molten. The still molten resin material in the resin reservoir is forcibly pushed back into the gate when the cut punch moves, so as to close the communication portion.

The Examiner maintains that the above method is shown in Miyairi, column 3, lines 60-65. However, column 3, lines 60-65 (Fig. 1) states that compression core 6 is moved forward to a position close to the nozzle tip 5a when the resin in the runner section 7 is still in a completely molten state. This is contrary to the method of claim 1, where only the inner portion of the resin in the resin reservoir is still in a molten state.

In addition, as recited in claim 1, the cut punch moves towards the gate to separate a resin molded product in the cavity from the resin in the resin reservoir, while an inner portion of resin in the resin reservoir is still molten and a portion of the resin material thereof that is in direct contact with the dies is gradually solidified after the resin has been charged into the cavity and resin reservoir. When the cut punch moves toward the gate, it not only forcibly pushes the still molten resin in the inner portion of the resin material in the resin reservoir back into the gate, but also cuts the resin material at the communication portion, so that a resin molded product formed in the cavity is separated from the resin solidified portion formed in the resin reservoir.

On the contrary, Miyairi, column 3, lines 63-65, states that while the molten resin is still in a completely molten state, resin is forced into both the hot nozzle 5 and cavity 3 as compression core 6 is moved forward. Therefore, since the resin material is still completely molten, the compression core 6 does not “cut” the resin material that has “partially solidified,” as stated in the method of claim 1. Rather, the resin material of Miyairi continues to be forced into cavity 3 as compression core 6 is moved forward and a favorable cut surface cannot be obtained. Therefore, the injection molding method of Miyairi does not teach or suggest the method of claim 1.

Accordingly, Applicant submits that claim 1 is patentable over the cited reference and respectfully requests the Examiner to withdraw the rejection.

Since claim 3 is dependent upon claim 1, Applicant submits that such claim is patentable at least by virtue of its dependency.

Turning to claim 6, the Examiner maintains that Miyairi discloses the claimed injection mold. However, Applicant respectfully disagrees and submits that claim 6 is patentable over the cited reference. In addition, Applicant submits that claim 6 includes the similar recitations of claim 1.

Specifically, as recited in claim 6, the cut punch moves toward the gate when an inner portion of the resin material that is present in the resin reservoir is still molten, while the portion of the resin material in contact with the cooled dies is gradually solidified. However, column 3, lines 60-65 (Fig. 1) of Miyairi states that compression core 6 is moved forward to a position close to the nozzle tip 5a when the resin in the runner section 7 is still in a completely molten state. This is contrary to claim 6, where only the inner portion of the resin in the resin reservoir is still in a molten state. Although claim 6 is an apparatus claim, Applicant submits that claim 6 recites enough structure in the beginning of the claim to support the wherein clauses.

In addition, claim 6 recites that the gate resides at a point where the runner contacts the resin reservoir and does not protrude into the resin reservoir. The Examiner maintains that nozzle tip 5a (Fig. 1) anticipates the claimed gate. Even assuming *arguendo* that tip 5a is the claimed gate, tip 5a extends or protrudes into reservoir 4, as shown in Figures 1-4.

Further, as stated in column 4, lines 30-32 of Miyairi, the reservoir 4 is formed on the movable mold half 2 and compression core 6 is arranged on the fixed die half 1. Claim 6 recites the exact opposite, by having the cut punch provided on the movable die and the reservoir formed as a recess in the fixed die.

Accordingly, Applicant submits that claim 6 is patentable over the cited reference and respectfully requests the Examiner to withdraw the rejection.

Since claim 8 is dependent on claim 6, Applicant submits that such claim is patentable at least by virtue of its dependency.

B. The Examiner has further rejected claims 1, 3, 6 and 8 under 35 U.S.C. § 102(b) as being anticipated by JP Publication No. 02-198816 to Suekichi ("Suekichi").

With respect to claim 1, the Examiner maintains that Suekichi discloses the claimed injection molding method. However, Applicant submits that claim 1 is not anticipated by Suekichi. For example, in claim 1, molten resin material is injected into a cavity defined by a fixed die and a movable die via a gate provided in the fixed die. The molten resin material is injected in a resin reservoir, where it then flows into the cavity by way of a communication portion between the resin reservoir and cavity. A cut punch, provided in the movable die, moves towards the gate to separate a resin molded product in the cavity from the resin in the resin reservoir, when an inner portion of resin in the resin reservoir is still molten. The still molten resin material in the resin reservoir is forcibly pushed back into the gate during a time when the cut punch moves, so as to close the communication portion.

The Examiner maintains that the above method is shown in Suekichi. However, as stated in the constitution section of the Suekichi abstract, punch 4 (Fig. 1) is allowed to advance before cooling and solidification of the molten resin. This is contrary to the method of claim 1, where only the inner portion of the resin in the resin reservoir is still in a molten state.

In addition, as recited in claim 1, the cut punch moves towards the gate to separate a resin molded product in the cavity from the resin in the resin reservoir, while an inner portion of resin in the resin reservoir is still molten and a portion of the resin material thereof that is in direct contact with the dies is gradually solidified after the resin has been charged into the cavity and resin reservoir. When the cut punch moves toward the gate, it not only forcibly pushes the still molten resin in the inner portion of the resin material in the resin reservoir back into the gate, but also cuts the resin material at the communication portion, so that a resin molded product formed in the cavity is separated from the resin solidified portion formed in the resin reservoir.

The Examiner maintains that Suekichi discloses such a feature, however, the abstract of Suekichi states that gate 2 is closed off from cavity 3 by advancing punch 4, to stop the inflow of molten resin into cavity 3. Therefore, since the resin material is still completely molten, the punch 4 does not “cut” the resin material that has “partially solidified,” as recited in the method of claim 1. Rather, the resin material of Suekichi continues to flow into cavity 3 as punch 4 is advanced. Therefore, the injection molding method of Suekichi does not teach or suggest the method of claim 1.

Accordingly, Applicant submits that claim 1 is patentable over the cited reference and respectfully requests the Examiner to withdraw the rejection.

Since claim 3 is dependent upon claim 1, Applicant submits that such claim is patentable at least by virtue of its dependency.

Turning to claim 6, the Examiner maintains that Suekichi discloses the claimed injection mold. However, Applicant submits that claim 6 is not taught or disclosed in Suekichi. For example, claim 6 recites that a resin reservoir is formed by recessing the fixed die toward the gate, where the cut punch can be inserted into the resin reservoir.

Even assuming *arguendo* that disc gate 2 of Suekichi corresponds to the claimed resin reservoir, gate 2 still does not meet the recitations of claim 6. As shown in Figures 1-3, the disc gate 2 appears to be part of or in line with cavity 3, rather than a separate cavity. Disc gate 2 appears to remain part of cavity 3 until punch 4 is advanced, which then separates the two areas. Also, gate 2 does not appear to be recessed into the fixed die.

Also, as stated in claim 6, the cut punch moves toward the gate when an inner portion of the resin material that is present in the resin reservoir is still molten, while the portion of the resin material in contact with the cooled dies is gradually solidified. However, the abstract of Suekichi states that gate 2 is closed off from cavity 3 by advancing punch 4 to stop the inflow of molten resin into cavity 3. Therefore, the resin material in Suekichi is still completely molten when punch 4 is advanced. This is contrary to claim 6, where only the inner portion of the resin in the resin reservoir is still in a molten state when the cut punch moves forward. Therefore, the injection mold of Miyairi does not teach or suggest the injection mold of claim 6.

Accordingly, Applicant submits that claim 6 is patentable over the cited reference and respectfully requests the Examiner to withdraw the rejection.

Since claim 8 is dependent upon claim 6, Applicant submits that such claim is patentable at least by virtue of its dependency.

III. Rejections under 35 U.S.C. § 103(a)

A. The Examiner has rejected claims 2-4 and 7-9 under 35 U.S.C. § 103(a) as being unpatentable over Miyairi in view of JP Publication No. 02-067115A to Ikuo ("Ikuo") and JP Publication No. 09-262880 to Kunio ("Kunio").

In regard to claim 2, the Examiner acknowledges that Miyairi fails to teach the plurality of cavities, resin reservoirs and cut punches, but maintains that Ikuo does. However, claim 2 is dependent upon claim 1, and as stated above, claim 1 is patentably distinct from the Miyairi reference. In addition, Ikuo does not suggest the patentably distinct features of claim 1. Therefore, since Ikuo fails to cure the deficiencies of Miyairi, Applicant submits that claim 2 is patentable.

In addition to rejecting claim 3 under 35 U.S.C. § 102(b), the Examiner further rejected claim 3 under 35 U.S.C. § 103(a). However, claim 3 is dependent upon claim 1, and as stated above, claim 1 is patentably distinct from the Miyairi reference. In addition, neither Ikuo nor Kunio suggest the patentably distinct features of claim 1. Therefore, since Ikuo and Kunio fail to cure the deficiencies of Miyairi, Applicant submits that claim 3 is patentable.

Turning to claim 4, the Examiner acknowledges that Miyairi fails to teach a valve gate structure, in which a valve gate is closed to close the gate after the cut punch has moved, but

maintains that Kunio does. However, claim 4 is indirectly dependent upon claim 1, and as stated above, claim 1 is patentably distinct from the Miyairi reference. In addition, Kunio does not suggest the patentably distinct features of claim 1. Therefore, since Kunio fails to cure the deficiencies of Miyairi, Applicant submits that claim 4 is patentable.

Turning to claim 7, the Examiner acknowledges that Miyairi fails to teach the plural pairs of cavities, resin reservoirs and cut punches, but maintains that Ikuo does. However, claim 7 is dependent upon claim 6, and as stated above, claim 6 is patentably distinct from the Miyairi reference. In addition, Ikuo does not suggest the patentably distinct features of claim 6. Therefore, since Ikuo fails to cure the deficiencies of Miyairi, Applicant submits that claim 7 is patentable.

In addition to rejecting claim 8 under 35 U.S.C. §102, the Examiner further rejected claim 8 under 35 U.S.C. §103(a). However, claim 8 is dependent upon claim 6, and as stated above, claim 6 is patentably distinct from the Miyairi reference. In addition, neither Ikuo nor Kunio suggest the patentably distinct features of claim 6. Therefore, since Ikuo and Kunio fail to cure the deficiencies of Miyairi, Applicant submits that claim 8 is patentable.

Turning to claim 9, the Examiner acknowledges that Miyairi fails to teach a valve gate structure, but maintains that Kunio does. However, claim 9 is indirectly dependent on claim 6, and as stated above, claim 6 is patentably distinct from the Miyairi reference. In addition, Kunio does not suggest the patentably distinct features of claim 6. Therefore, since Kunio fails to cure the deficiencies of Miyairi, Applicant submits that claim 9 is patentable.

B. The Examiner has further rejected claims 2-4 and 7-9 under 35 U.S.C. § 103(a) as being unpatentable over Suekichi in view of Ikuo and Kunio.

In regard to claim 2, the Examiner acknowledges that Suekichi fails to teach the plurality of cavities, resin reservoirs and cut punches, but maintains that Ikuo does. However, claim 2 is dependent upon claim 1, and as stated above, claim 1 is patentably distinct from the Suekichi reference. In addition, Ikuo does not suggest the patentably distinct features of claim 1. Therefore, since Ikuo fails to cure the deficiencies of Suekichi, Applicant submits that claim 2 is patentable.

In addition to rejecting claim 3 under 35 U.S.C. §102, the Examiner further rejected claim 3 under 35 U.S.C. §103(a). However, claim 3 is dependent upon claim 1, and as stated above, claim 1 is patentably distinct from the Suekichi reference. In addition, neither Ikuo nor Kunio suggest the patentably distinct features of claim 1. Therefore, since Ikuo and Kunio fail to cure the deficiencies of Suekichi, Applicant submits that claim 3 is patentable.

Turning to claim 4, the Examiner acknowledges that Suekichi fails to teach a valve gate structure, in which a valve gate is closed to close the gate after the cut punch has moved, but maintains that Kunio does. However, claim 4 is indirectly dependent upon claim 1, and as stated above, claim 1 is patentably distinct from the Suekichi reference. In addition, Kunio does not suggest the patentably distinct features of claim 1. Therefore, since Kunio fails to cure the deficiencies of Suekichi, Applicant submits that claim 4 is patentable.

Turning to claim 7, the Examiner acknowledges that Suekichi fails to teach the plural pairs of cavities, resin reservoirs and cut punches, but maintains that Ikuo does. However, claim

7 is dependent upon claim 6, and as stated above, claim 6 is patentably distinct from the Suekichi reference. In addition, Ikuo does not suggest the patentably distinct features of claim 6. Therefore, since Ikuo fails to cure the deficiencies of Suekichi, Applicant submits that claim 7 is patentable.

In addition to rejecting claim 8 under 35 U.S.C. §102, the Examiner further rejected claim 8 under 35 U.S.C. §103(a). However, claim 8 is dependent on claim 6, and as stated above, claim 6 is patentably distinct from the Suekichi reference. In addition, neither Ikuo nor Kunio suggest the patentably distinct features of claim 6. Therefore, since Ikuo and Kunio fail to cure the deficiencies of Suekichi, Applicant submits that claim 8 is patentable.

Turning to claim 9, the Examiner acknowledges that Suekichi fails to teach a valve gate structure, but maintains that Kunio does. However, claim 9 is indirectly dependent on claim 6, and as stated above, claim 6 is patentably distinct from the Suekichi reference. In addition, Kunio does not suggest the patentably distinct features of claim 6. Therefore, since Kunio fails to cure the deficiencies of Suekichi, Applicant submits that claim 9 is patentable.

IV. Newly Added Claims

Applicant has added new claims 13-18 to provide more varied protection of the present invention. Since claims 13-18 contain similar features discussed above for claims 1 and 6, Applicant respectfully submits that claims 13-18 are patentable.

Amendment under 37 C.F.R. § 1.111
U.S. Application No. 09/622,360

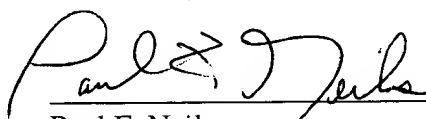
New claim 18 sets forth an injection mold using means plus function language to give weight to the function of the cut punch, where the cut punch is driven to close the communication portion at a time when an inner portion of the resin is still molten. The driving means (Fig. 1; pusher plates 16a, 16b, hydraulic cylinder 17 and spring 18) is described in the specification at the bottom of page 17 and further at the bottom of page 20.

V. Conclusion

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

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PATENT TRADEMARK OFFICE

Date: March 3, 2003

APPENDIX
VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE SPECIFICATION:

The specification is changed as follows:

Page 22, the second full paragraph was amended as follows:

Further, Figs. 8 to 13 show the second embodiment for fabricating thin annular parts using a hot runner type four-cavity mold based on a valve gate system. Fig. 8 shows only a half of the four-cavity injection mold, omitting the other half [on the back of the sheet]. The following description is based on the half of the mold with two cavities shown in Fig. 8, and a description of the other half [on the back of the sheet] is omitted.

IN THE CLAIMS:

The claims are amended as follows:

1. (Once Amended) An injection molding method [wherein a molten resin material, which is injected into a cavity defined by a fixed die and a movable die via a runner provided in the fixed die, is introduced from a gate provided in the fixed die and is molded, characterized in that]comprising:

injecting a molten resin material into a cavity defined by a fixed die and a movable die via a runner provided in the fixed die and a gate provided in the fixed die,

wherein when the molten resin material is being charged into the cavity through the resin reservoir from the gate, a cut punch, which is provided in the side of the movable die that confronts the gate through a resin reservoir formed by recessing the fixed die toward the gate and

which is movably provided so that the cut punch is inserted into the resin reservoir so as to be in slidable contact with the resin reservoir, has a distal end thereof extending in a moving direction thereof that is toward the resin reservoir of the cut punch, and the distal end is located between the resin reservoir and the cavity at such a position as to open a communicating portion that allows the resin reservoir and the cavity to communicate with each other so that the molten resin material is introduced into the cavity via the resin reservoir; and

wherein when an inner portion of the resin material that is present in the resin reservoir is still molten and a portion of the resin material thereof that is in direct contact with the cooled dies is gradually solidified after the molten resin material has been charged into the cavity and the resin reservoir, the cut punch moves toward the gate so that the cut punch is inserted into the resin reservoir, whereby the cut punch not only closes the communicating portion while forcibly pushing the still molten resin material present in the resin reservoir back into the gate, but also cuts the resin material at the communicating portion so that a resin molded product formed in the cavity is separated from a resin solidified portion formed in the resin reservoir.

4. (Once Amended) An injection molding method according to claim 3, [characterized in that]wherein the hot runner has a valve gate structure, in which a valve gate is closed to close the gate after the cut punch has moved.

5. (Once Amended) An injection molding method according to [any one of claims 1 to 4, characterized in that]claim 1, wherein a resin molded product having an opening is molded by a

resin reservoir and the cut punch inserted into the resin reservoir, the resin reservoir being provided so as to correspond to a shape of the opening of the resin molded product.

6. (Once Amended) An injection mold [wherein a fixed die and a movable die form a cavity into which a molten resin material injected via a runner provided in the fixed die is introduced from a gate provided in the fixed die, characterized in that]comprising:

[the gate is connected to the cavity through a resin reservoir formed by recessing the fixed die toward the gate]a fixed die and a movable die which form a cavity into which a molten resin material is injected via both a runner and a gate provided in the fixed die, the gate being connected to the cavity through a resin reservoir formed by recessing the fixed die toward the gate; and

a cut punch [is] provided on the side of the movable die that confronts the gate through the resin reservoir, the [.]cut punch being movable so that the cut punch can be inserted into the resin reservoir so as to be in slidable contact with the resin reservoir[;],

wherein when the molten resin material is being charged into the cavity, a distal end of the cut punch which [extending]extends in a moving direction of the cut punch that is toward the resin reservoir is located between the resin reservoir and the cavity at such a position as to open a communicating portion that allows the resin reservoir and the cavity to communicate with each other so that the molten resin material is introduced into the cavity via the resin reservoir; [and]

wherein when an inner portion of the resin material that is present in the resin reservoir is still molten and a portion of the resin material thereof that is in direct contact with the cooled dies is gradually solidified after the molten resin material has been charged into the cavity and the resin reservoir, the cut punch moves toward the gate so that the cut punch is inserted into the

resin reservoir, whereby the cut punch not only closes the communicating portion while forcibly pushing the still molten resin material present in the resin reservoir back into the gate, but also cuts the resin material at the communicating portion so that a resin molded product formed in the cavity is separated from a resin solidified portion formed in the resin reservoir[.], and

wherein the runner contacts the resin reservoir, and the gate is disposed at the point where the runner contacts the resin reservoir, such that the gate does not protrude into the resin reservoir.

10. (Once Amended) An injection mold according to [any one of claims 6 to 9]claim 6, wherein the injection mold is used to mold a resin molded product having an opening and has a resin reservoir and a cut punch inserted into the resin reservoir, the resin reservoir and the cut punch being provided so as to correspond to the opening of the resin molded product.

11. (Once Amended) An injection mold according to [any one of claims 6 to 10]claim 6 wherein a depth as viewed in a moving direction of the cut punch in the resin reservoir is 1.5 to 10 times an opening distance of the communicating portion.

12. (Once Amended) An injection mold according to [any one of claims 6 to 11]claim 6, comprising an undercut portion on the distal end of the cut punch, the undercut portion serving to hold the resin solidified portion formed in the resin reservoir at the time of mold opening.

Claims 13-18 are added as new claims.